

Core literature WTMC

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Introduction

The Dutch national research school WTMC seeks to analyze, understand and explain the manifold and intricate relationships between science, technology and modern culture. This, of course, is an interdisciplinary effort that draws from and contributes to various research traditions, each with their own literatures. In this overview we list the core literature of the research school WTMC. The aim of this list is threefold:

- it provides an introduction to the intellectual and academic aspirations of WTMC;
- it helps PhD students to locate their studies within a broader set of literatures;
- it supports the ongoing reflection of research agendas within WTMC.

The list of core literature is organized into three categories: classics, introductions and research clusters. The first, the *classics*, is a list of books that operate as a landmark in the broad, yet distinguished field of WTMC research. These scholarly works have introduced a new perspective that has been proved to be useful - and they still inspire the today's researchers. Their contribution to the field is uncontested, although their factual claims may have been challenged, as it should. The classics are systematically introduced and discussed in the WTMC PhD workshops.

The second list, of *introductions*, is in particular useful for new entrants in the field. The classics, of course, are also informative, but may require more background knowledge. The introductions provide an overview of the main perspectives, methods and findings of the research field of WTMC.

The third category, the *research clusters*, proposes a grouping of the many lines of research in WTMC. Within each of the clusters some key references and journals are suggested to orient the individual researcher. They are also used in the programmes of the PhD workshops. Together, the research clusters are a demonstration of the richness and excitement of the research school WTMC.

The overview ends with a list of journals that are important for the research school WTMC and an Appendix of annotations of some of the works listed in this overview.

Classics

- Thomas S. Kuhn, 1970, *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press (2nd ed.).
- Karl R. Popper, 1963, *Conjectures and Refutations*. London: Routledge and Kegan Paul.
- L. Fleck (1935), *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv* Schwabe und Co., Verlagsbuchhandlung, Basel (English translation: *The Genesis and Development of a Scientific Fact*, Chicago: University of Chicago Press, 1979)
- Bruno Latour and Steve Woolgar, (1979), *Laboratory life: The social construction of scientific facts*. London: Sage (2nd edition 1986)
- Nathan Rosenberg, 1982, *Inside the Black Box: Technology and Economics*. Cambridge: Cambridge University Press
- Derek J. de Solla Price, 1963, *Little Science, Big Science*, New York: Columbia University Press
- Robert K. Merton, 1973, *The Sociology of Science: Theoretical and Empirical Investigations*. Chicago: University of Chicago Press, esp. part 3, 4 and 5.
- Lewis Mumford, 1934, *Technics and Civilization*. New York: Hracourt, Brace, and World Inc.
- Michel Foucault, 1975, *Surveiller et Punir*. Parijs: Gallimard. Nederlandse vertaling 1989, *Discipline, Toezicht en straf: de geboorte van de gevangenis*, Groningen: Historische uitgeverij
- Latour, B. (1987). *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.
- Dosi, G., Freeman, C., Nelson, R., Silverberg, G., & Soete, L. (1988). *Technical change and economic theory*. London: Pinter.
- Hughes, T. P. (1983). *Networks of Power, Electrification in Western Society, 1880–1930*. Baltimore: Johns Hopkins University Press.
- W. Bijker, T. P. Hughes & T. J. Pinch (Eds.), (1987) *The social construction of technological system*, Cambridge: MIT Press.
- M. Douglas (1987), *How Institutions Think*, 1987, London: Routledge.

Introductions

General introductions:

- Jasanoff, Sheila, Gerald E. Markle, James C. Petersen, and Trevor Pinch, eds. (1995). *Handbook of Science and Technology Studies*. London: Sage.
- E. Hackett, O. Amsterdamska, M. Lynch, J. Wajcman eds. (2007) *New Handbook of Science, Technology, and Society*, Cambridge: MIT Press.
- Bauchspies, W. K., Croissant, J., & Restivo, S. (2006). *Science, technology, and society: a sociological approach*. Malden, MA: Blackwell Publishing.
- Sismondo, S. (2004). *An Introduction to Science and Technology Studies*. London: Blackwell Publishers

Introductions into the “W of WTMC:

- Biagioli, M., 1999, *The science studies reader*, New York and London: Routledge.
- David J. Hess, 1997, *Science Studies. An Advanced Introduction*. New York: New York University Press.
- Rob Hagendijk, 1996, *Wetenschap, Constructivisme en Cultuur*. Amsterdam: Universiteit van Amsterdam. (in Dutch).
- Barry Barnes, David Bloor and John Henry, 1996, *Scientific Knowledge. A Sociological Analysis*. London: The Athlone Press.

Introductions into the “T” of WTMC:

- Wiebe Bijker and John Law (1992) - *Shaping Technology / Building Society: Studies in Sociotechnical Change*, Cambridge, MA: MIT Press.
- Donald MacKenzie and Judy Wajcman (Eds.) (1999) *The Social Shaping of Technology*. McGraw Hill Education (second ed., first edition 1985)
- Collins, Harry and Pinch, Trevor (1998) *The Golem at Large: What You Should Know about Technology* (Cambridge Cambridge University Press).

Introductions into the “MC” of WTMC:

- During, S., (ed.), (1993), *The Cultural Studies Reader*, London and New York: Routledge.
- Thomas Misa, Philip Brey & Andrew Feenberg (eds) (2003) , *Modernity and Technology*, Cambridge, MA: MIT Press.
- Latour, Bruno (2005) *Reassembling the Social: an Introduction to Actor-Network-Theory* (Oxford: Clarendon)
- Knut H. Sorensen and Robin Williams (Eds) (2002), *Shaping Technology, Guiding Policy: Concepts, Spaces and Tools*, Cheltenham, UK: Edward Elgar.

Research clusters

We think the various perspectives and themes within WTMC can be clustered into about 20 categories. See table. We also indicate the relative weight of the focus on Science (W), Technology (T) and/or Modern Culture (MC).

research cluster	focus on W, T or MC?
Sociology of science	W
Technology studies	T
Philosophy of science	W
Philosophy of technology	T
History of science	W
History of technology	T
Questioning modernity	MC
Innovation studies	T
Ethnography of science and technology	WT
Risk and uncertainty	TMC
Knowledge society	MC
Ethics of science and technology	MC
Cultural studies	MC
Governance of science and technology	WTMC
Public understanding of science and technology	WTMC
Technology assessment and participatory approaches	T
User studies	T
Scenarios and expectations	TMC
Sociology of health and the body	WTMC
Nature, space and environment	WTMC

research cluster	some key references
Sociology of science	<p>Bloor, David, 1991 [1976] <i>Knowledge and Social Imagery</i>, Chicago: University of Chicago Press, 2nd edition.</p> <p>Pickering, Andrew (ed.), 1992, <i>Science as Practice and Culture</i>. Chicago: University of Chicago Press.</p> <p>Whitley, Richard, 1985, <i>The Intellectual and Social Organization of the Sciences</i>. Oxford: Oxford University Press.</p>
Technology studies	<p>MacKenzie and Wacjman, 1985 [2nd ed. 1999], <i>The Social Shaping of Technology</i>. Buckingham: Open University Press.</p> <p>Callon, M., 1986, 'The sociology of an actor-network: The case of the electric vehicle', in: Callon, Law and Rip (eds.), <i>Mapping the dynamics of Science and Technology</i>, pp. 77-102.</p> <p>Bijker, W.E., 1995, <i>Of Bicycles, Bakelites and Bulbs: Towards a theory of sociotechnical change</i>, Cambridge: MIT Press.</p>
Philosophy of science	<p>Gillies, Donald, 1993, <i>Philosophy of Science in the Twentieth Century: Four Central Themes</i>. Oxford: Blackwell</p> <p>Hacking, Ian, 1983, <i>Representing and intervening: Introductory topics in the philosophy of natural science</i>, Cambridge: Cambridge University Press.</p>
Philosophy of technology	<p>Val Dusek (2006) , <i>Philosophy of Technology: An Introduction</i> Blackwell Pub.</p> <p>Frederick Ferré (1995), <i>Philosophy Of Technology</i> University of Georgia Press.</p> <p>Mitcham, Carl. (1994) <i>Thinking through Technology: The Path between Engineering and Philosophy</i>. University of Chicago Press. Chicago</p>
History of science	<p>Shapin, Steven, and Simon Schaffer, 1985, <i>Leviathan and the Air-Pump</i>. Princeton: University Press.</p> <p>Porter, T., 1995, <i>Trust in numbers: The pursuit of objectivity in science and public life</i>, Princeton University Press</p>
History of technology	<p>Merrit Roe Smith & Leo Marx (eds.), (1994) <i>Does Technology Drive History? The Dilemma of Technological Determinism</i>. Cambridge MA.: MIT Press</p> <p>Edgerton, D., 1999, 'From innovation to use: ten eclectic theses on the historiography of technology' <i>History and Technology</i> 16, pp.111-136.</p> <p>Ruth Oldenziel (1999) <i>Making technology masculine. Men, women & modern machines in America 1870-1945</i>, Amsterdam University Press</p>
Critical approaches	<p>Haraway, D.J., 1991, <i>Simians, cyborgs, and women : the reinvention of nature</i>, London : Free Association Books</p> <p>Latour, Bruno, 1993, <i>We have never been modern</i>, transl. by Catherine Porter. New York [etc.] : Harvester Wheatsheaf, cop. 1993. - Vert. van: Nous n'avons jamais été modernes. - Paris : La Decouverte, 1991.</p> <p>Misa, Brey & Feenberg (eds), <i>Modernity & Technology</i>, Cambridge, MA: MIT Press, 2003</p>
Innovation studies	<p>Garud, Raghu, and Peter Karnøe (eds.), (2001) <i>Path Dependence and Creation</i>. Mahwah , N.J.: Lawrence Erlbaum Associates.</p> <p>Utterback, J. M. (1996). <i>Mastering the dynamics of innovation</i>. Boston, Massachusetts: Harvard Business School Press.</p> <p>Coombs, R., Green, K., Richards, A., & Walsh, V. (2001). <i>Technology and the Market. Demand, Users and Innovation</i>. Cheltenham, UK: Edward Elgar.</p>

Ethnography of science and technology	<p>Collins, Harry M., 1985, <i>Changing order: Replication and induction in scientific practice</i>. London: Sage</p> <p>Knorr Cetina, Karin (1999), <i>Epistemic Cultures. How the Sciences Make Knowledge</i>. Cambridge: Harvard University Press.</p> <p>Hine, C. (2000). <i>Virtual Etnography</i>. London: Sage.</p>
Risk and uncertainty	<p>Ulrich Beck, 1992, <i>Risk Society: Towards a new Modernity</i>, Sage, London.</p> <p>Maarten Hajer, 1995, <i>The Politics of Environmental Discourse: Ecological modernization and the policy process</i>. Oxford: Clarendon Press.</p> <p>Jasanoff, S. 1990, <i>The Fifth Branch: Science advisers as policymakers</i>. Cambridge: Harvard UP.</p>
Knowledge society	<p>Gibbons et al., 1994, <i>The new production of knowledge: the dynamics of science and research in contemporary societies</i>. London, etc.: Sage.</p> <p>Beck, Giddens, Lash, 1994, <i>Reflexive Modernisation: Politics, tradition, and esthetics in the modern social order</i>. Cambridge: Polity Press.</p> <p>Castells, 1996 [second edition 2000], <i>The Rise of the Network Society (The information Age, vol. 1)</i>, Cambridge: Blackwell Publishers.</p>
Ethics of science and technology	<p>Keulartz, J., M.Schermer, M.Korthals, T.Swierstra (Eds.) (2002). <i>Pragmatist Ethics for a Technological Culture</i>. Deventer: Kluwer Academic Publishers</p> <p>Mitcham, Carl, R Shannon Duval. (1999) <i>Engineering Ethics</i>. Prentice Hall. Upper Saddle River, New Jersey.</p>
Cultural studies	<p>During, S., (ed.), 1993, <i>The Cultural Studies Reader</i>, London and New York: Routledge.</p> <p>DuGay, P., S. Hall, L. Janes, H. MacKay and K. Negus, 1996, <i>Doing Cultural Studies – The Story of the Sony Walkman</i>. London, Sage Publications.</p>
Governance of science and technology	<p>Sclove, R. (1995). <i>Democracy and Technology</i>. New York: Guilford Press.</p> <p>David Held, 1995, <i>Democracy and the Global Order</i>, Cambridge: Polity Press.</p>
Public understanding of science and technology	<p>Nelkin D. (1995), <i>Selling Science. how the press covers science and technology</i> Freeman Press, 1995</p> <p>Wynne, Brian (1996), "May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Devide."in <i>Risk, Environment & Modernity: Towards a New Ecology/</i>, edited by Scott Lash, Bronislaw Szerszynski, and Brian Wynne. London, etc.: Sage Publications, 44-83.</p> <p>Alan Irwin & Mike Michael (2003) <i>Science, social theory & public knowledge</i>, Milton Keynes: Open University Press</p>
Technology assessment and participatory approaches	<p>Rip, A., T. Misa & J. Schot, 1995, <i>Managing Technology in Society</i>, London: Pinter.</p>
User studies	<p>Oudshoorn, N., & Pinch, T. (2003). <i>How Users Matter: The Co-construction of Users and Technology</i>. Cambridge: MIT Press.</p> <p>M Lie & K Sorensen (1996) <i>Making technology our own, domesticating technology into everyday life</i>, Oslo: Scandinavian University Press</p>

Scenarios and expectations	Brown, N., Rappert, B., & Webster, A. (2000). <i>Contested Futures - a sociology of prospective techno-science</i> : Aldershot.
Sociology of health and the body	Mol, A. (2002). <i>The Body Multiple: Ontology In Medical Practice</i> . Durham, NC: Duke University Press.
Nature, space and environment	Blume, Stuart, <i>Insight and Industry. On the Dynamics of Technological Change in Medicine</i> . Cambridge MA: MIT Press.
	Haraway, D. (1991). <i>Simians, Cyborgs and Women: The Reinvention of Nature</i> . New York: Routledge.
	P Macnaughten, J Urry <i>Contested Natures - Sage: Thousand Oaks, CA, 1998</i>
	Sarah Whatmore (2002), <i>Hybrid Geographies: Natures Cultures Spaces</i> , London: Sage.
	Peter Peters (2006), <i>Time Innovation and Mobilities</i> , London: Routledge

Some important WTMC Journals

WTMC scholars tend to write and read in the following journals (not complete):

- *Social Studies of Science*
- *Science, Technology and Human Values*
- *Science as Culture*
- *Research Policy*
- *Scientometrics*
- *Technology and Culture*
- *Krisis*(Dutch)
- *Economy and Society*
- *Sociology of Health and Illness*
- *Public Understanding of Science*
- *Technological Forecasting and Social Change*
- *Futures*
- *Science and Public Policy*
- *Theory, Culture and Society*
- *Genetics and Society*
- *Technology Analysis & Strategic Management*

Appendix: Annotations to the Core list of WTMC

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CLASSICS

Popper – Conjectures and refutations

“We learn from our mistakes” is probably the most influential adage in 20th Century philosophy of science, and is the leading thought in Poppers falsificationist program. *Conjectures and refutations* brings together a series of essays in which Popper relates his epistemological and social philosophical work.

Fleck – Genesis and Development of a Scientific Fact

Fleck’s *Genesis and Development of a Scientific Fact*, originally published in German in 1935 is said to be the first sociology of science publication and has been of great influence on, amongst others, Kuhn and Merton. Fleck in this book introduces the concepts of the ‘thought collective’ and ‘thought style’ in a fascinating analysis of the development of the Wassermann reaction for the diagnosis of syphilis.

Latour & Woolgar – Laboratory Life: The Social Construction of Scientific Facts

Through (participant) observation at a laboratory of the Salk Institute for Biological Studies (USA), the first author followed closely the daily processes of scientific work –what scientists do and how and what they say– in order to unravel the social construction of scientific facts. This book is apart from being one of the first thorough anthropologies of science, rather unique in the acknowledgement that the authors’ account is also an example of a social construction of scientific facts.

Bruno Latour, *Science in Action*

This book gives a very vivid account of science and technology (‘technoscience’, as Latour calls it) in the making. By analysing the technoscience practice (‘follow the actor’) he describes what scientists and engineers actually do, the role of scientific literature, the activities of laboratories, the institutional context of technoscience in the modern world, and the means by which inventions and discoveries become accepted. Latour argues that the then common notion of ‘diffusion’ is not adequate to describe this process of acceptance and, instead, analyses it as a translation process in which scientists and engineers try to enrol other actors.

Bijker, Hughes and Pinch, *The Social Constuction of Technological Systems*

This book contains a collection of papers first presented at a workshop at the University of Twente in 1984. It was one of the first international gatherings of researchers that were developing new approaches to analyse technical development in relation to its societal embedding. This meeting can be seen as one of the birthplaces of modern technology studies as an international community. The book contains early papers on the SCOT approach (Pinch and Bijker), Systems approach (Hughes) and Actor Network approach (Callon) along with many other studies that inspired later work in the field.

Thomas Hughes, *Networks of Power, 1983*

This book does two things. First, it provides an introduction to the analysis of Large Technical Systems. Central concepts to analyze such systems are ‘momentum’ (interdependencies in the system create a direction of developments that cannot easily be changed), ‘reverse salient’. Second, it is a

detailed reconstruction of the moves by which Thomas Edison succeeded in creating networks of (electrical) power.

Douglas – How Institutions Think

Instead of describing organisational decisions as the outcome of negotiations between powerful individuals within the organisation, Mary Douglas argues in her book (an anthropological study) that organisational decisions are largely shaped by the institutional ‘culture’. In her terms, institutions exercise ‘social control of cognition’.

INTRODUCTIONS

Sismondo, Introduction STS

This book provides an introduction into the major debates that have shaped STS. It deals with sociological questions as well as the philosophical issues (positivism, the Duhem-Quine thesis, falsification). The various standpoints in these debates are introduced, commented upon and illustrated with examples.

Wiebe E. Bijker & John Law (eds) 1992 *Shaping technology/building society. Studies in sociotechnical change*, Cambridge, MA: MIT Press.

This is the product of one of the famous Twente workshops which take place every few years. The Bijker, Hughes & Pinch (1987 – *Social construction of technological systems*) and Misa, Brey & Feenberg (2003 – *Modernity and Technology*) volumes are also the products of Twente workshops. This book has 10 chapters plus an introduction and a ‘postscript’ by Bijker and Law. This is where you will find Latour’s descriptions of doors and keys and the various ways responsibility and action can be delegated to both humans and non-humans. There is also an article by Akrich and one by Akrich & Latour together, which are both often cited in discussions of scripts, de-scripting and in-scripting.

Donald MacKenzie & Judy Wajcman (eds) *The social shaping of technology*, Milton Keynes: Open University Press, 1st edition 1985, 2nd edition 1999.

The first edition of this book was one of the very first books to both introduce the ‘social shaping’ approach and to bring together important articles from a range of sources. The first edition has four parts. The first includes an excellent introductory essay by the editors together with four classic articles/extracts from books by Langdon Winner, Thomas Hughes, Ruth Schwartz Cowan and Cynthia Cockburn. The other three parts cover production, domestic and military technologies, including some older classic texts from Karl Marx and Harry Braverman as well as newer, more clearly STS texts. The second edition is similarly structured, though instead of a part devoted to domestic technologies there is one devoted to reproductive technologies. Eleven of the 30 chapters in the second edition are the same as the first edition. The new additions are indeed new, having themselves been published after the appearance of the first edition. These are both extremely useful edited collections, which include some familiar names but also ones likely to be less familiar. If you are ever teaching an ‘introduction to STS’ course, these would be good books to use for students unfamiliar with STS but able to read ‘original’ texts. The editors wrote a new introduction for the second edition which probably seemed like a good idea at the time. In retrospect, it probably wasn’t necessary as the introduction to the first edition is much better and more substantive – setting out clearly different approaches to studying the technology-society relationship, explaining what technology is and how it should be understood as social. If you have the choice, read the introduction to the first edition.

Harry Collins & Trevor Pinch (1998) *The Golem at Large. What you should know about technology*, Cambridge: Cambridge University Press.

This is the second in a series of books – the first was about science (1993) and the most recent about medicine (2005). Collins and Pinch introduce the golem, a creature from Jewish mythology, made by humans of clay and water, an animated being that neither knows its own strength nor its own ignorance. The golem is used by Collins and Pinch as a metaphor for technology (and science and

medicine), drawing attention to the ways in which technology is a product of human activities. Drawing on the STS tradition which focuses on controversies and failure (often associated with the Edinburgh Strong Programme, and Collins' interpretation of it), the book presents a series of case studies including the role of the Patriot anti-missile missile in the Gulf War, the Challenger space shuttle explosion, alternative airplane fuels, the Chernobyl nuclear disaster, economic modeling and the contribution of lay expertise to the analysis of treatments for AIDS. These latter two are particularly interesting, as the case study of economic modeling is a good example of using STS insights to look at something usually considered to be a social science, and the second because it prepares the ground for more recent work by Collins on expertise.

During – The Cultural Studies Reader

The *Cultural Studies Reader* offers a wide historical overview of original contributions by such writers as Barthes, Adorno, Lyotard, Stuart Hall, Bourdieu and Spivak (and many more), each with an introduction by the editor pointing at further readings, as well as a wealth of topics, ranging from the city to multiculturalism, to shopping centres and sports. During's introductory essay provides for a good overview of the field.

Misa, Brey, & Feenberg – Modernity and Technology

Modernity and Technology provides for a collection of papers connecting modernity studies with the sociology and philosophy of technology, ranging from theoretical explorations in the first part to empirical studies in the second to political questioning of technology in the last.

Sorensen & Williams – Shaping technology, guiding policy

Shaping technology, guiding policy offers a collection of essays that both theoretically and empirically explore relations between technology and policy, bringing together STS and institutional economic perspectives. The book is written mainly by northern European authors (from the Scandinavian countries, the UK and the Netherlands) and contains a very useful glossary of theoretical concepts (including their origins and references).